August 18, 2005

Mr. Karl W. Singer
Chief Nuclear Officer and
Executive Vice President
Tennessee Valley Authority
6A Lookout Place
1101 Market Street
Chattanooga, TN 37402-2801

SUBJECT: SEQUOYAH NUCLEAR PLANT, UNITS 1 AND 2 - RESPONSE TO NRC BULLETIN 2003-01, "POTENTIAL IMPACT OF DEBRIS BLOCKAGE ON EMERGENCY SUMP RECIRCULATION AT PRESSURIZED-WATER REACTORS" (TAC NO. MB9620)

Dear Mr. Singer:

This letter documents Nuclear Regulatory Commission (NRC) staff's acceptance of Tennessee Valley Authority's (TVA's) response dated August 8, 2003, to NRC Bulletin 2003-01, "Potential Impact of Debris Blockage on Emergency Sump Recirculation at Pressurized-Water Reactors," dated June 9, 2003. The NRC issued Bulletin 2003-01 to all pressurized-water reactor licensees requesting that they provide a response, within 60 days of the date of Bulletin 2003-01, that contains either the information requested in the following Option 1 or Option 2 as stated in Bulletin 2003-01:

Option 1: State that the emergency core cooling system (ECCS) and containment spray system (CSS) recirculation functions have been analyzed with respect to the potentially adverse post-accident debris blockage effects identified in the Discussion section, and are in compliance with all existing applicable regulatory requirements.

Option 2: Describe any interim compensatory measures that have been implemented or that will be implemented to reduce the risk which may be associated with potentially degraded or nonconforming ECCS and CSS recirculation functions until an evaluation to determine compliance is complete. If any of the interim compensatory measures listed in the Discussion section will not be implemented, provide a justification. Additionally, for any planned interim measures that will not be in place prior to your response to this bulletin, submit an implementation schedule and provide the basis for concluding that their implementation is not practical until a later date.

You provided an Option 2 response.

Bulletin 2003-01 discussed six categories of interim compensatory measures (ICMs): (1) operator training on indications of and responses to sump clogging; (2) procedural modifications if appropriate, that would delay the switchover to containment sump recirculation (e.g., shutting down redundant pumps that are not necessary to provide required flows to cool the containment and reactor core, and operating the CSS intermittently); (3) ensuring that alternative water sources are available to refill the refueling water storage tank or to otherwise provide inventory to inject into the reactor core and spray into the containment atmosphere;

(4) more aggressive containment cleaning and increased foreign material controls; (5) ensuring containment drainage paths are unblocked; (6) ensuring sump screens are free of adverse gaps and breaches.

You stated in your bulletin response of August 8, 2003, that you had already implemented the following ICMs:

(1) a new plant emergency procedure, EA-63-8, "Monitoring for Containment Sump Blockage," initiated from existing procedure ES-1.3, "Transfer to Residual Heat Removal System (RHR) Sump Recirculation," with appropriate training for Technical Support Center (TSC), radiological control, licensed operators and radiological event emergency responders (it is noteworthy that, in the event of degrading trends in monitored parameters, EA-63-8 would direct operators to evaluate stopping one train of the CSS and ECCS pumps, if both trains are running, in order to reduce net positive suction head (NPSH) losses for the remaining recirculation pumps, as well as reduce the potential for further clogging of the sump screens) - ICM category #1;

(2) existing procedure ECA-1.1 initiates refueling water storage tank (RWST) refill once it has been determined that loss of safety injection recirculation capability exists, from normal and alternate sources, and directs reactor coolant system (RCS) makeup via an alternate source (normal charging with centrifugal charging pump suction aligned to volume control tank) - ICM Category #3;

(3) existing formal programs for inspecting and cleaning areas inside containment - ICM Category #4;

(4) existing drain inspections for blockage and drain path inspections for being clear and free flowing - ICM Category #5;

(5) existing containment sump inspections including sump screen inspections for degradation - ICM Category #6.

You also stated in your Bulletin 2003-01 response that you would be implementing the following ICM: increasing sump drain path inspections from once every two outages to once every outage - ICM Category #5.

You further stated in your Bulletin 2003-01 response that, as part of a debris transport analysis, it was determined that adequate NPSH is available even with screen blockages as high as 90 percent.

In an October 27, 2004, response to a September 29, 2004, NRC request for additional information (RAI) you:

(1) elaborated on operator training for emergency procedure EA-63-8, including the baseline sump recirculation readings operators are required to take, the readings to be monitored for change, and the actions to be taken if system degradation/sump clogging is observed - ICM Category #1;

(2) explained that within procedure ES-1.3 there are specific steps to be taken should sump suction be lost, and that appropriate training is conducted on this procedure - ICM Category #1;

(3) provided TVA's evaluation of the 12 applicable Westinghouse Owner's Group (WOG) Candidate Operator Actions (COAs) contained in WCAP-16204, Revision 1, "Evaluation of Potential ERG [Emergency Response Guideline] and EPG [Emergency Procedure Guideline] Changes to Address NRC Bulletin 2003-01 Recommendations (PA-SEE-0085)."

Your WOG COA discussion contained the following information:

(1) COA A1a, "Operator Action to Secure One Spray Pump," concluding that the risks associated with a single failure of the remaining spray train appeared to outweigh the "modest" benefits for your ice condenser plant;

(2) COA A1b, "Operator Action to Secure Both Spray Pumps," concluding that this action would be contrary to safe operation for an ice condenser plant, which is designed without fan coolers;

(3) COA A2, "Manually Establish One Train of Containment Sump Recirculation Prior to Automatic Actuation," concluding that for ice condenser plants (with relatively small RWSTs and ice melt inventory) the quick timing of such actions would create significant operator burden during the busy injection phase of a loss-of-coolant accident (LOCA);

(4) COA A3, "Terminate One Train of Safety Injection After Recirculation Alignment," concluding that, with low ECCS flow relative to CSS flow, and short operator reaction times for ECCS restart, this action was not considered justifiable;

(5) COA A4, "Early Termination of One Low Pressure Safety Injection/Residual Heat Removal Pump Prior to Recirculation Alignment," concluding that, due to high spray flow rate at your ice condenser designed plant, and the lack of fiber to be transported to the sump, this action would not be risk beneficial;

(6) COA A5, "Refill a Refueling Water Storage Tank," concluding that this action is risk beneficial after both the ECCS and CSS are aligned for sump recirculation (and that a procedure change implementing this action would be completed by spring 2005) - ICM Category #3;

(7) COA A6, "Inject more than one RWST Volume," concluding that, (1) for your ice condenser plant, water levels would be at mid-plane of the RCS piping, outside of the reactor vessel upon the nozzles and well above the core without this action, and (2) if the RWST is empty and the ECCS pumps must be stopped due to loss of suction, procedures direct operators to initiate RCS makeup via an alternate source (normal charging with centrifugal charging pump suction aligned to the volume control tank);

(8) COA A7, "Provide More Aggressive Cooldown and Depressurization Following a Small Break LOCA," concluding that this action is already addressed in procedure ES-1.2, "Post-LOCA Cooldown and Depressurization," but noting that, due to CSS actuation, the plant will be in sump recirculation within 1 hour regardless of efforts to control cooldown rate, and further noting that Sequoyah's use of reflective metal insulation on RCS piping and components makes it unlikely that sump blockage will occur for small breaks - ICM Category #1;

(9) COA A8, “Provide Guidance on Systems and Identification of Containment Sump Blockage, concluding that this action is implemented by the development of a new procedure EA-63-8, “Monitoring for Containment Sump Blockage” - ICM Category #1;

(10) COA A9, “Develop Contingency Actions in Response to Containment Sump Blockage, Loss of Suction, and Cavitation,” concluding that this action will be completed by incorporation of a new WOG Sump Blockage Control Room Guideline by spring 2005 - ICM Category #1;

(11) COA A10, “Early Termination of One Train of HPSI [High-Pressure Safety Injection]/High Head Injection Prior to Recirculation Alignment (RAS),” concluding that this COA is applicable only to Combustion Engineering designed plants, unlike Sequoyah’s Westinghouse design;

(12) COA A11, “Prevent or Delay Containment Spray for Small-Break LOCAs (<1.0 inch diameter) in Ice Condenser Plants,” concluding that Sequoyah’s exclusively reflective metal (non-fiber) insulation containments, the small amount of expected debris, the inter-dependencies of spray setpoints with other functions, and the associated significant analysis, plant modification, and license amendment workload, all indicate that this limited benefit action is not warranted.

In your October 27, 2004, RAI response you also provided a detailed technical explanation as to why, for your ice condenser designed plant, it is impractical to delay switchover to containment sump recirculation by changing core spray operations or set points.

The NRC staff has considered your Option 2 response for compensatory measures that were, or were to have been, implemented to reduce the interim risk associated with potentially degraded or nonconforming ECCS and CSS recirculation functions. Based on your response, the NRC staff considers your actions to be responsive to, and meet the intent of, Bulletin 2003-01.

Should you have any questions, please contact me at 301-415-1364 or the lead PM for this issue, Alan Wang at 301-415-1445.

Sincerely,

/RA/

Douglas V. Pickett, Senior Project Manager, Section 2
Project Directorate II
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket Nos. 50-327 and 50-328

cc: See next page

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ADAMS Accession No.: ML052280279 NRR-106

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